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✓✓ LABOR REQUIREMENTS FOR LIVESTOCK ON WISCONSIN DAIRY FARMS 1/

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Summary

Work on the livestock of a dairy farm in Wisconsin of average size takes about the equivalent of one person's time. The cows take about 75 percent of it, the young dairy cattle account for another 10 percent, so the dairy enterprise alone takes 85 percent of the time spent in caring for the livestock on a dairy farm.

Large herds naturally take more time than small herds, but the time used for each cow in a 30-cow herd may not be much different than the time spent per cow in a 15-cow herd. The considerable differences in the number of man hours used per cow in various herds are largely explained by the method of milking and the ratio of the number of units of mechanical milking equipment to the number of persons doing chores.

Dairy farmers who milked by hand used 182 hours of labor per cow in 1947. Those who had about one mechanical milking unit for each person milking used 150 hours per cow. And those who had about 2 milking units

1/ This report covers one phase of a broader study of adjustments, costs and returns on commercial family-operated dairy farms, by size of farm, in two generalized type-of-farming areas in Wisconsin.

for each person milking used only 113 hours per cow. This last group of farmers generally did not have more milking units in proportion to the number of cows; instead, they had fewer persons doing chores in proportion to the size of the herd. The influence of that relationship was reflected also in the time spent by each of the three groups of farmers in taking care of an animal unit of other cattle and horses.

Much of the chores was done by members of the farm family, and this work is valuable in the training of young workers. But generally, where the family help was plentiful more time was spent per head in taking care of livestock than where fewer workers were used.

Generally, the farmers who spent the least time on their livestock cared for their livestock as well and got as much milk per cow as the others. But the arrangement of their barns and their equipment was somewhat better.

How the Study Was Made

This analysis of labor requirements for livestock on dairy farms is based upon information obtained by personal interview from 120 selected dairy farmers in two major type-of-farming areas in Wisconsin (see fig. 1).

The method of selecting the sample locations and the sample farms for the study was as follows:

(1) Each of the two type-of-farming areas designated in figure 1 was divided into a northern and a southern subarea. A county was then selected at random in each of the four subareas, and a township was chosen in the same way in each of the four counties.

(2) As a basis for stratification of dairy farms for enumeration in the sample townships, five typical sizes of herd on dairy farms were established by setting up frequency distributions of the number of dairy cows and size of farm for all farms in the two type-of-farming areas. The data for making the frequency distributions were obtained from the U. S. Census of Agriculture for 1945. The ranges in number of cows for the five sizes of herd were: 10 - 14, 15 - 19, 20 - 24, 25 - 29, and 30 or more.

(3) In each of the four sample townships, six dairy farms (and an equal number of alternates) were drawn at random to represent each of the five sizes of herd. The selection of names of farmers was made from township assessors' lists.

Information was obtained from the first six farmers, or an alternate in the list of 12, for each of the five size-of-herd groups in the four townships in April and May of 1947, while the cows were still stabled, and again in August while the cows were on pasture.

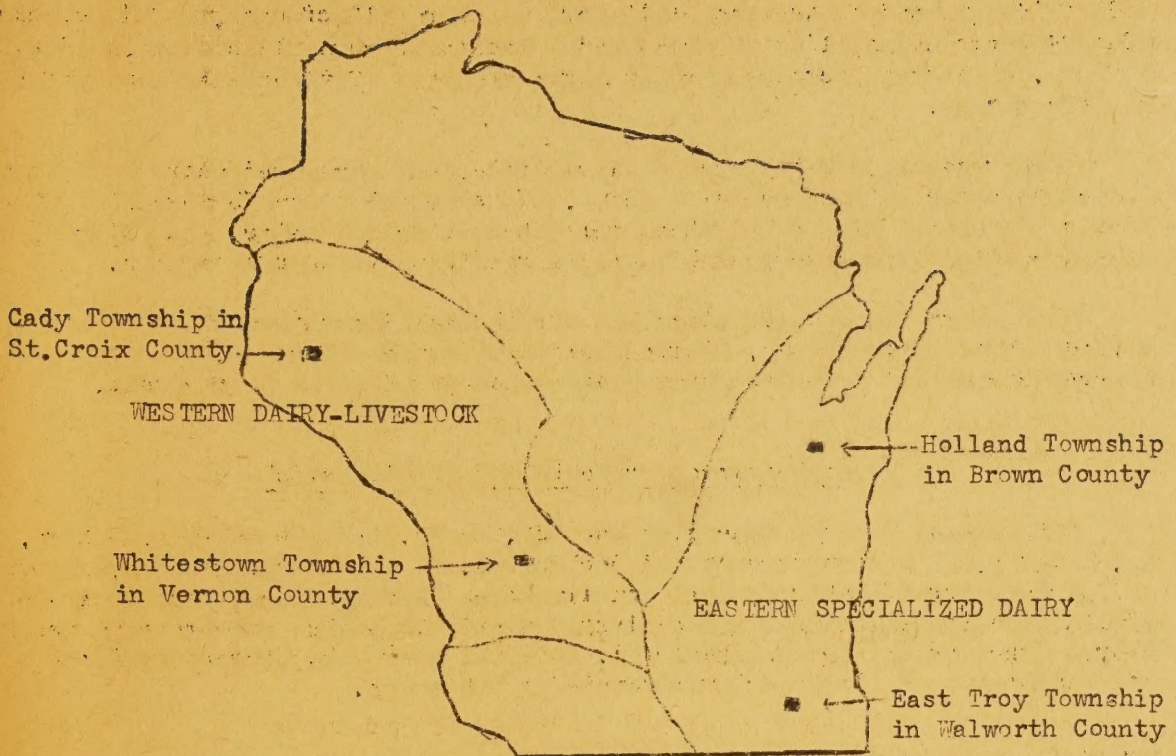


Fig. 1.- Location of the type-of-farming areas and the sample townships where farm records were taken.

The information recorded included the time and number of persons working on cows, other cattle, hogs, poultry, and horses in the morning, during the day, and in the evening. Similar facts were obtained for the special jobs that are not done daily. The milking time was obtained separately from the other work on milk cows. On ten farms rather detailed information was obtained on the time used by such operations as putting down hay; putting down silage; feeding grain, silage, and hay; preparing utensils; and cleaning barn. Some operations were timed. In all cases the over-all time for each class of livestock was obtained separately for the winter and the summer. As most of the farmers were interviewed between 6:30 a.m. and 7:30 p.m., chore work during some part of the day was observed on nearly all of the 120 farms that were visited.

Organization of the Farms

The principal crops grown on these farms were corn, oats, and hay. Acreages of these crops and the total acreages of the farms were about in proportion to the number of cows in each size group. The 24 farms having

10 to 14 cows had an average of 10 acres of corn, 15 of oats, and 19 of hay. The 24 farms having 15 to 19 cows had 15 acres of corn, 18 of oats, and 24 of hay. The total acreage per farm averaged about 7 times the number of cows in each group.

Other cattle, mostly young dairy cattle, also averaged nearly a constant percentage (60) of the number of cows. Hens were kept on 73 percent of the farms. Flocks of 100 to 125 hens were the most common size. The flocks averaged slightly larger on the large farms than on the small farms.

Hogs were kept on less than half of the small farms and on about two-thirds of the larger ones. Horses were found on 86 percent of the farms-- there were usually 2 on the small farms and 3 or 4 on the large ones.

Time Required for Each Class of Livestock

The average farm in the study had 22.6 cows, 14 other cattle, 6 hogs, 2.4 horses, and a few more than 100 chickens. On this average farm, a total of 3,916 hours of labor was used on livestock. Two-thirds of this was used during the stabling period which lasted nearly 7 months. The rest was spent during the pasture period (table 1). Slightly more than three-fourths of the labor used on livestock was devoted to the cows.

Table 1.- Numbers of livestock and hours of labor used annually per farm on 120 farms for specified classes of livestock, winter, summer, and total, and percentage distribution of labor by seasons, 1947

Class of livestock	Winter			Summer			For the year		
	Labor		Percent of total	Labor		Percent of total	Labor		Percent of total
	Number 1/	Hours		Number 1/	Hours		Number 1/	Hours	
Cows	22.8	1,995	75.7	22.4	1,064	83.0	22.6	3,059	78.1
Other cattle	14.2	345	13.1	13.9	60	4.7	14.0	405	10.4
Hogs	4.1	70	2.7	8.5	40	3.2	6.3	110	2.8
Chickens	108.0	117	4.5	103.0	83	6.4	106.0	200	5.1
Horses	2.5	107	4.0	2.4	35	2.7	2.4	142	3.6
Total		2,634	100.0		1,282	100.0		3,916	100.0

1/ The average number of cows and other cattle on these farms is larger than the average for all farms in the areas the study represents, because this sample does not cover herds of less than 10 cows and the 5 size-of-herd groups above 10 cows were each represented by an equal number of farms. The average for all farms is about 17 cows and 10 head of other cattle.

The time spent on each class of livestock is much less in the pasture period than in the stabling period. On the basis of 207 days in the winter, or stabling period, the work in winter on livestock averaged 12.7 man hours per day and the work in the 158 days in the pasture period averaged 8.1 man hours per day. The shorter time per day during the summer is due mainly to the time saved in feeding and cleaning the barn, especially for cows and other cattle. During the busy cropping season, farmers also hustle more with their chores.

Factors Affecting Labor on Dairy Herd

Ratio of Milking Equipment to Supply of Labor.—The amount of help, mainly family help, in the areas studied is the main factor affecting the hours of labor used per cow. On the 52 farms where help was so scarce that about 2 mechanical milking units were used per person milking, the average time per cow was 113 hours for the year (table 2). The 37 farmers who had about 1 milking unit for each person milking used 150 hours per cow. On the other hand, 30 farmers, many of whom had a larger number of family workers, milked by hand; they used 182 hours of labor per cow. The differences between each group and the next in these averages are more than four times the standard error of the differences of the averages.

Table 2.—Hours of labor used for 1 cow, 1 unit of other cattle, and 1 horse, and percentage of farms using female family and hired help, on specified groups of farms, 1947

Group of farms	No. of farms	Hours per cow			Hours per unit of:		Percentage of farms using:	
		Milking	Other	Total	Other cattle	Horse	Female family help	Hired help
Two mechanical milking units per person milking 1/	52	54	59	113	30	55	29	25
One mechanical milking unit per person milking 2/	37	78	72	150	36	65	54	16
Hand milking	30	110	72	182	37	70	67	3

1/ Includes all farms on which $1\frac{1}{2}$ or more mechanical milking units were used per person milking.

2/ Includes all farms on which fewer than $1\frac{1}{2}$ mechanical milking units were used per person milking.

The hours of labor on other classes of livestock were less also on the group of 52 farms that had about 2 milking units per person milking than on the group of 37 farms that had about 1 milking unit per person milking, and considerably less than on the group of 30 farms on which milking was done entirely by hand.

Differences between these groups in the time used in milking alone are significant. The average was 54 hours per cow with 2 milking units per person milking, 78 hours for the intermediate group, and 110 hours for hand milking. But it is noticeable also that farms in group 1 used less labor for chores on cows other than for milking and for chores per unit of other cattle and per horse than groups 2 and 3 respectively (table 2).

There were slight differences in barn arrangement and in equipment and other facilities which would account for possibly 2 or 3 hours of difference between these groups in time for chores regarding cows other than for milking. The main difference, however, seems to be in the ratio of milking equipment to number of persons milking. The farmers in group 1 seemed also to have a greater urge to get through with the work. In other words they "step on it" a little harder than those in groups 2 and 3. The fact that more hired help and less family help (especially less female family help) was used on the farms in group 1 probably is an incentive for getting more work done per hour. Nineteen of the 52 farmers in group 1 used less than 100 hours of man labor per cow per year.

The quantity of milk produced per cow was about the same for each of the three groups of farms.

Size of Herd.- The largest herd kept at one farmstead was 45 cows; the smallest was 12 cows. Within this range there was a tendency to use more labor on a cow in a small herd than on one in a large herd. A dot chart of the data shows a slightly greater concentration of farms having between 100 and 120 hours than in any other range for herds of 12 to 19 cows, whereas, for herds of 20 to 29 cows the greatest concentration of farms is between 80 and 100 hours. These differences are not statistically significant because the number of cases is small. But anyone familiar with dairy chores in the northern dairy region can see a slight advantage in time per cow in caring for a 25- to 29-cow herd compared with a 10- to 15-cow herd if 2 milking units are available per person milking in each herd. The time for preparing and cleaning milk utensils and putting down silage and hay, does not increase quite in proportion to the number of cows up to perhaps 25 or 30 cows, plus 15 or 20 head of other cattle. Beyond that it is doubtful whether there are net advantages in larger cow herds from the standpoint of labor efficiency. Distances that feed must be distributed in the barn and hauled from the fields, cows must be driven to and from pasture, and manure and bedding must be hauled--all these increase as the size of herd increases. Disease control becomes more difficult and labor problems multiply.

The writer has observed the chore work on a few farms in the northern dairy region having herds of 100, 400, and 1,200 cows. Milking goes along rapidly in the barns in which 50 to 100 sound cows, that are accustomed to the milking machines are kept. But large farms usually have some cows in separate barns which require special care and take more time. When all of the time on all of the cows is considered, the hours per cow per year do not decrease as the number of cows in the herd increases above 20 to 30 cows. More supervision is required when several hired workers are employed. Problems with hired labor and other difficulties have been so serious, especially during the last few years, on large farms where several hundred

cows are housed at one central group of barns that some of the oerpators say they favor separate units on each of which one family handles a farm with about 30 cows.

Machine Stripping.- Nine farmers used the milking machines for getting all of the milk; they did no hand stripping. The time per cow for the year on these farms averaged 52 hours for milking and 106 hours total. That is 2 hours less for milking and 7 fewer total hours than the average of group 1 in table 2--the group who had about 2 milking units per person milking. Six of the 9 farmers who stripped with machines took care of their cows with less than 100 hours per cow.

Machine stripping is recommended by research men in dairy production for farmers who do their own milking or who have high-grade hired labor. The Geneva Station, New York, found that 85 to 90 percent of the cows which they have experimented with can be trained to milk out in 4 to 5 minutes. 2/

Number of Cows Per Person.- The number of workers available is the principal determinant of the number of hours of labor used per cow per year. It is possible for one person to care for 30 cows without working an excessive number of hours per day or during the year. But on many farms on which the herds were 30 cows or less, boys or girls and their mothers helped. As the number of cows per person doing chores decreased, the number of hours used for taking care of a cow increased (table 3). Thus the rate of work ordinarily varies inversely with the number of workers.

Table 3.- Relationship between number of cows per person doing chores and the hours used per cow for herds milked with milking machines

Number of cows per person doing chores	:	Number of farms	:	Hours per cow
Under 10	:	17	:	170
10 - 14	:	31	:	135
15 - 19	:	28	:	113
20 and over	:	13	:	96

Barn Arrangement and Barn Equipment.- One farmer of the 120 interviewed had a machanical barn cleaner for removing manure, 55 had center driveways in the barn which they could drive through with a manure spreader, 33 had litter carriers, 24 used wheelbarrows, and 9 used other methods. Ninety-four had drinking cups for the cows so they had access to water in the stables at all times.

A report of a study of methods of cleaning barns 3/ shows labor requirements for the 7 winter months as follows: Mechanical barn cleaner, 1.24 man

2/ Dahlberg, A. C. "The Influence on Milk Production of a Definite Time Interval for Milking Cows by Machine." N. Y. (State) Sta. Bul. 697 (1941).. pp. 1 - 13.

3/ Nauheim, Charles W. "Mechanical Barn Cleaners." Bur. of Agr. Econ. U. S. Dept. Agr. June 1946. (Processed)

hours per cow stanchioned; spreader hand-loaded in center driveway, 3.42 hours per cow; litter carrier hand-loaded and dumped into spreader, 6.06 hours per cow; and wheelbarrow hand-loaded and dumped on pile, 6.15 hours per cow.

The farmers who used 2 milking units per person milking had barns that were somewhat better equipped and arranged than those who had 1 milking unit per milker, and both of these groups had some advantages in equipment and arrangement over those who did the milking by hand (table 4). Fifty percent of the dairy barns in group 1 had a center driveway; 45 percent, in group 2; and 40 percent, in group 3. That amount of difference in barn arrangement would account for about 2 hours difference between groups 1 and 3 in labor per cow for cleaning the barn in winter. The high proportion of center driveways gives group 1 a slight additional advantage over groups 2 and 3 in turning out the cows and getting them back into their stalls, in bedding them, and in milking.

Table 4.- Percentage of specified groups of farms which used various methods of cleaning barns and watering cows

Method of cleaning barn and watering cows	Group 1: 52	Group 2: 38	Group 3: 30
	farms that had 2 milking units per person milking	farms that had 1 milking unit per person milking	farms that milked by hand
	Percent	Percent	Percent
Cleaning method			
Center driveway	50	45	40
Litter carrier	29	29	24
Wheelbarrow	10	21	33
Other	11	5	3
Total	100	100	100
Watering equipment			
Cups	87	79	68
Tank	11	18	32
Other	2	3	-
Total	100	100	100

Drinking cups were a part of the barn equipment on 78 percent of all the farms in this survey. Eighty-seven percent of the farms in group 1 had drinking cups; 79 percent, in group 2; and 68 percent, in group 3. The difference in the proportion of farms having drinking cups in these 3 groups, would probably make less than 1 hour of difference in the average time required per year to care for a cow, but milk production per cow is usually increased by having water available at all times.

Factors other than barn arrangement and barn equipment, such as the number of milkers per person milking, the urge for getting through with chores, and the natural abilities of the workers in doing chores, caused so much larger differences among farms in the time used per cow that they tended to cover up the net effect of center drives and mechanical barn equipment. The differences due to these latter factors are not large enough to be adequately measured by the over-all estimates of chore time that were used in this study.

The time that can be saved in a year on a given farm by rearranging the barn, or by adding new equipment, can be readily calculated by estimating fairly closely the daily saving in time. Thus, if a barn cleaner saves 20 minutes daily during a stabling season of 210 days for a herd of 20 cows, the annual saving in time would be 70 hours. If milking by hand takes an average of 18 minutes daily (2 milkings) per cow in the herd, and using 2 milking units per person cuts the time to 9 minutes, the saving per cow in 365 days would be 55 hours per cow. At this rate the saving on a 20-cow herd would be 1,100 hours a year. The average time per cow for milking on the farms in this survey was 54 hours in group 1 (2 milking units per person) and 110 hours per cow in group 3, in which the cows were hand milked.

The number of milking machines nearly doubled in some counties in Wisconsin between 1942 and 1945--a period during which the number of farm workers was greatly reduced. Allocation of materials for making milking machines was liberal because of the circumstances.

Location of Pastures.-- Putting the cows out to pasture and bringing them back to the barn takes up considerably more time on some farms than others. Approximately 10 percent of the interviewed farmers had lanes and pastures so arranged that the cows could go to and from the pasture by themselves. Another 15 percent of the farmers estimated that it took 20 minutes of a worker's time a day; another 15 percent estimated 30 minutes; another 15 percent estimated 40 minutes; and another 20 percent estimated 1 hour per day. Three percent said that they used more than an hour. The rest gave estimates that were scattered within this range of time. Usually, the time included two round trips daily. Some farmers had night pasture near the barnyard so that trips to pastures in the late evening and early morning were short.

Use of DDT and Other Fly Sprays.-- About half of the farmers in the survey used DDT on their cows and nearly one-third of them sprayed the inside of their barns and milk houses (where farms had milk houses) with DDT. The time spent in spraying to control flies has been shortened on several farms by using DDT on the cows, in the barn, and in the milk house. By thorough spraying, the number of sprayings has been reduced from daily or twice-a-day to as low as one per season on a few farms. Other farmers use DDT as often as once a week. In any case some time is saved by the proper use of good DDT preparations. The fly nuisance on cows, in barns, and in milk houses has been practically eliminated on many farms so that the summer chores can be done much more comfortably.

Use of Milking Machines and Labor Used per Cow, by Counties

Milking was done by hand on one farm in Walworth County, 8 in Brown, 11 in Vernon, and 10 in St. Croix. Twenty of the Walworth County farms had 2 milking units per person milking, compared with 14 in Brown, 10 in Vernon, and 8 in St. Croix. Consequently, the average hours of labor per cow per year in Walworth County were only 135 hours, compared with more than 140 hours in each of the other counties. However, in the group of farms which had 2 milking units per person milking, those in Walworth County used 126 hours of labor per cow compared with 115 for Brown, 97 for Vernon, and 95 for St. Croix. In the other two groups of farms the hours per cow were nearly the same for each county.

The reason for the differences noted above in favor of Brown, Vernon, and St. Croix, especially the last two, probably lies in the smaller proportion of fully equipped farms in those counties. In Vernon and St. Croix Counties, only those farmers who were really short of labor owned 2 milking units per person milking. They had the greatest need for saving labor. In Walworth County, on the other hand, milking machines had become so general that some farmers who apparently did not need to save time were fully equipped. Hence, several farmers in Walworth County who had 2 milking units per person milking had high labor requirements. If the 7 farmers in Walworth County who used 140 or more hours per cow were eliminated, the remaining 13 would average 107 hours per cow. Higher sanitary requirements and more grain feeding in summer in Walworth County raise the labor requirements perhaps 5 or 10 hours, but hardly account for 30 hours above those used in Vernon and St. Croix Counties.

How to Care for Cows with 100 or Less Hours of Labor per Cow

Six recommendations seem to shape themselves as a result of this survey.

(1) Use 2 milking units per person milking on herds as small as 10 cows if profitable alternative uses for labor are available.

(2) If there is an abundant supply of family labor, use different members alternately on milking chores and other productive work such as a larger poultry flock. The educational value of regular chores for young people is not to be overlooked, but their time should be used profitably.

(3) Train as many cows as possible to milk out in 4 or 5 minutes and to milk out clean without hand stripping. Six of the 9 farmers in this survey who did not hand strip did their chores in less than 100 hours per cow for the year.

(4) Provide adequate accessible pasture for as many days as possible.

(5) Improve the barn arrangement and equipment for feeding and cleaning to save time and energy.

(6) Use DDT as a fly spray on cows, in the barn, and in the milk house because the application does not need to be so often as for the older fly sprays which are effective for only a half day.